Research of Some Cultivars of Winter Barley (Hordeum vulgare) for Beer Production in Agro-Ecological Condition of Kosovo

Agro-Ecology

Keywords: Winter barley, 1000 seed weight, hectoliter weight, yield.

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Abstract

The object of study is the characterization of some winter barley cultivars (Hordeum vulgare), originating from Croatia. The survey included a total of 6 cultivars of barley: Bingo, Zlatko, Vannes, Esterel, Barun and Rex as comparative. Obtained cultivars regarding research pertaining to winter barley two rowed. Investigations were carried out in two agro-climatic regions of Kosovo (in Arbnesh, in research farm of the agricultural institute of Kosovo, Peja - Dukagjini Plain, and Pestova - Kosovo Plain, private property company "Pestova". Research tested yield (kg / ha), the weight of 1000 seeds (gr.) hectoliter weight (kg), protein content (%), moisture (%), and Starch. The amount of protein in barley grain is one of the most important factors on which depend on the quality of beer production. In the amount of protein in barley grain with lots of variety characteristic, significantly influences the climate and agronomic factors of production, soil conditions during the vegetative season. Kosovo's agro-climatic and pedagogical data, compared with the yields obtained in the culture of winter barley show not using cultivated cultivars genetic potential to us. For this reason should be applied to a modern agro to exploit the genetic potential, and obtain higher yields. obtained results regarding showed that there were significant differences due to climatic conditions and different levels for all cultivars investigated traits involved in the plot compared to the standard (Rex) and between localities.

Introduction

Barley (coarse hordeum) is one of the oldest agricultural crops, which is used primarily for human consumption, and is now used primarily for the production of malt in beer industry and animal nutrition. Barley in Kosovo, which crop planted every year to meet the necessary requirements for this crop producers to meet the requirements of high yielding quality producers and many other factor necessary for maltim as raw material for the production of beer, it is necessary the research of new cultivars in agro-ecological conditions of Kosovo (Bertholdsson N. O. 1999), (Macgregor AW. 1991). Kosovo has very good agro-ecological conditions for the cultivation of this crop. Changing the structure of the variety that has come as a result of planting varieties associated with different climatic conditions in Kosovo (Thomson JR, 1979), (Van Gastel AJG. 2005). In these circumstances it is important to conduct studies for the evaluation of different varieties of barley on the main characteristics that define the quantity and quality of production of beer (Schelling K. 2003), (Alley MM . 1997). Survey of barley based on field and laboratory research. This research analyzed the Agricultural Institute of Kosovo and Sh. A. Birra Peja. The research included 6 Received cultivars from Croatia. The aim of the research is the cultivation of these varieties influence of external factors and environmental conditions, climate zones, soil, and factors that are affected depends on the person, for the application of agricultural techniques (Papastylianou I. 1995), (Wall work MAB 1998). From various studies it appears that the main characteristics of manufacturing malt from barley seeds are protein content and their plant energy (Macgregor AW, 1998); (Bhuta, W, M, 20075). The impact of these conditions will be studied in two climate zones in Peja-plane Dukagjini and Pestova Kosovo plane. Kosovo's agro-climatic and pedological data, compared with the yields obtained in the culture of barley indicate not to use genetic potential cultivars cultivated in (Costa j. M. - Boller, G.A.: 2001).

For this reason should be applied to a modern agro to exploit the genetic potential, and obtain higher yields. Kosovo's agro-climatic and pedological data, compared with the yields obtained in the culture of barley show that the amount of reserves potentially barley that can be produced are large (Kunze W, 2004), (Munck L,

1991). Production potential of barley cultivars that are grown in our conditions is over 8 t / ha, while the use of this potential in the country's average level ranges (2.5 - 3.2 t / ha). Main factor for the reception of high yields of barley culture are improving varietal structure, new technologies, designed on the basis of the best achievements in scientific research studies and in the region.

Materials and methods

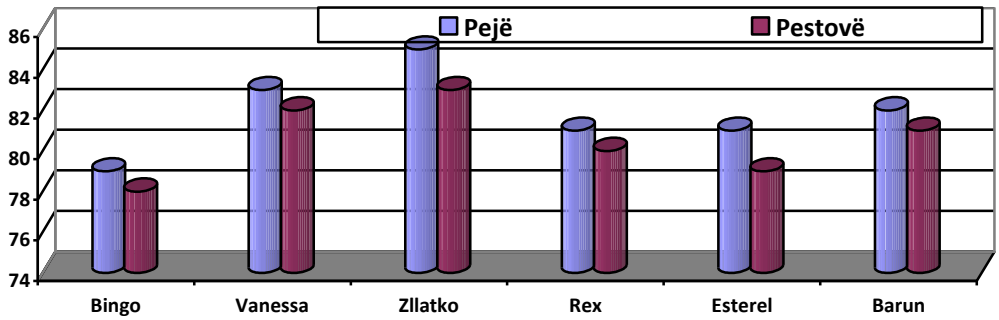
Research object are comparing 6 winter barley cultivars (Hordeum vulgare) in agro-ecological conditions of the Republic of Kosovo. Investigations were made during the years 2011 and 2012. Cultivars: 1. Bingo 2. Vanesa 3. Zlatko 4. Rex 5. Esterel 6. Barun. The experiment was set according to the system block system with three replication in randomized (Anonym. Brabender. 1995); (Gaqesha S, Schuster, Weinfurtner, Narziss. 1990). Each experimental plot area is 10 m2 (10 m length x 1 m width). Depth of planting 3 - 5 cm. between varieties will be left separating distance 30 cm and between iterations 50 cm. planting should be done with experimental car Hege 80. After planting will be held phonological records as the time of arrival of the main stages of development on the exit surface (agronomic sprung), brotherhood, Rise, charges, annealing milk, wax annealing, full annealing, biometric measurements, chemical analysis, analysis of state of sleep and energy plant power (Conry M.J. 1997); (Anderson OD 1988). All tests shall be made for each variety and for each of the ecological zones where you will be planting.

Results and discussion

After sowing of barley in plots immediately started tracking parameters such as density on 1 m length after 10 days in two areas of the plant shown in Table 1. Table1. Plant density in plots on day 10 (ten) after planting in two areas of 6 cultivars the year 2011 – 2012.

Cultivars	Peja	Pestova
	Density on 1 m length (after 10 days)	Density on 1 m length (after 10days)
Bingo	79	78
Vanessa	83	82
Zllatko	85	83
Rex	81	80
Esterel	81	79
Barun	82	81

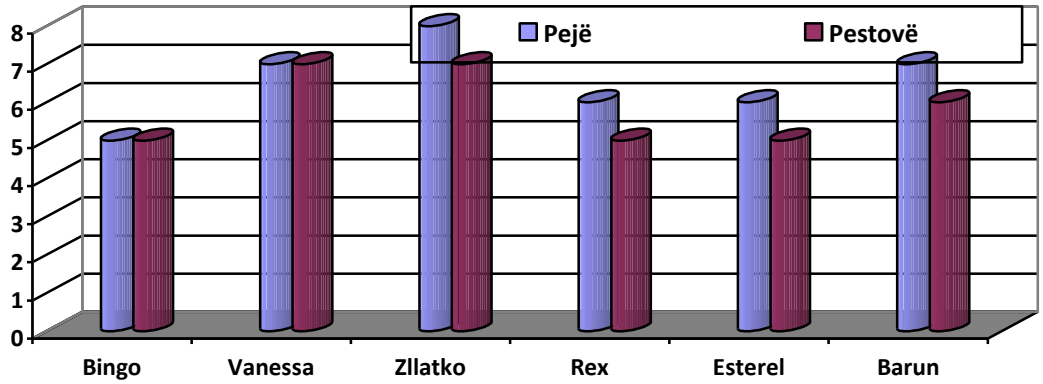
On the day of 10 (ten) after planting in all varieties of barley is done to determine the density of plants in rows that counting three lines in length (3 X 1 meter) with random system (Mckenzie, R.H. Middleton, A.B. & Bremer, E. 200511). Seen Zlatko variety has the largest number 85.



Graph 1. Plant density in plots on day 10 (ten) after planting in two areas of 6 cultivars the year 2011 – 2012 The results achieved have presented in Table 2. Where we have put the number of seedlings of three replication. Regarding the number of seedlings (stalks) all cultivars were found positive differences. Barley cultivars the greatest number is found the cultivar Zlatko 8.

Table 2. Number of seedlings (stalks) in two areas of 6 cultivars the year 2011-2012

Cultivars	Peja	Pestova
	Number of seedlings (stalks) brotherhood	Number of seedlings (stalks) brotherhood
Bingo	5	5
Vanessa	7	7
Zllatko	8	7
Rex	6	5
Esterel	6	5
Barun	7	6



Graph 2. Number of seedlings (stalks) in two areas of 6 cultivars the year 2011-2012

Table 3. Plants density and height of the stalk in two areas of 6 cultivars

Cultivars	Peja		Pestova	
	Density (m^2)	Height stalk (cm)	Density (m^2)	Height stalk (cm)
Bingo	480	79	475	78
Vanessa	490	80	492	79
Zllatko	495	84	500	82
Rex	485	83	480	81
Esterel	479	79	475	77
Barun	488	81	485	72

Regarding the stem height of all cultivars of barley tested were found positive differences in relation to cultivars. Height of the stem is found to cultivar Zlatko 85 cm, while other varieties have been hanging somewhere in between. Density of plants per m^2 is cultivar Zlatko 510.

Table 4. Submission of development feno-phases day

Feno-phases development day							
Cultivars	Localities	Planting	rise	increase	notification	flourishing	annealing
Bingo	Peja	03.11.2011	10	150	168	177	232
	Pestova	04.11.2011	11	151	171	179	234
Vanessa	Peja	03.11.2011	11	151	173	181	235
	Pestova	04.11.2011	12	154	176	185	237
Zllatko	Peja	03.11.2011	10	151	170	178	233
	Pestova	04.11.2011	11	152	172	179	235
Rex	Peja	03.11.2011	11	152	172	179	233
	Pestova	04.11.2011	12	153	175	181	235
Esterel	Peja	03.11.2011	12	154	179	187	239
	Pestova	04.11.2011	13	156	181	189	241
Barun	Peja	03.11.2011	11	152	171	178	234
	Pestova	04.11.2011	12	154	173	180	236

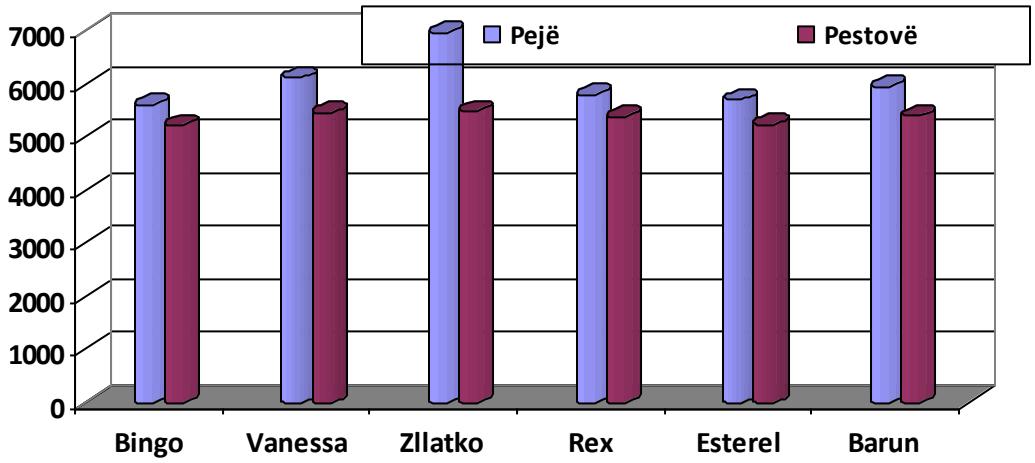
Table 5. Energy plant and plant-vegetation

Cultivars	Pejë		Pestovë	
	Energy plant %	plant-vegetation %	Energy plant %	Plant-vegetation %
Bingo	99	98	99	97
Vanessa	99	98	99	97
Zllatko	99	97	99	98
Rex	99	97	99	98
Esterel	99	98	99	97
Barun	99	98	99	97

In Table 4 are presented results during the vegetation a day, while in Table 5 are shown the results of the vegetation energy and plant-vegetation.

Table 6. Yield (kg) in two areas of the 6 cultivars

Cultivars	Peja	Pestova
	Yield kg	Yield kg
Bingo	5.613	5.220
Vanessa	6.117	5.450
Zllatko	6.972	5.485
Rex	5.798	5.388
Esterel	5.702	5.225
Barun	5.955	5.400



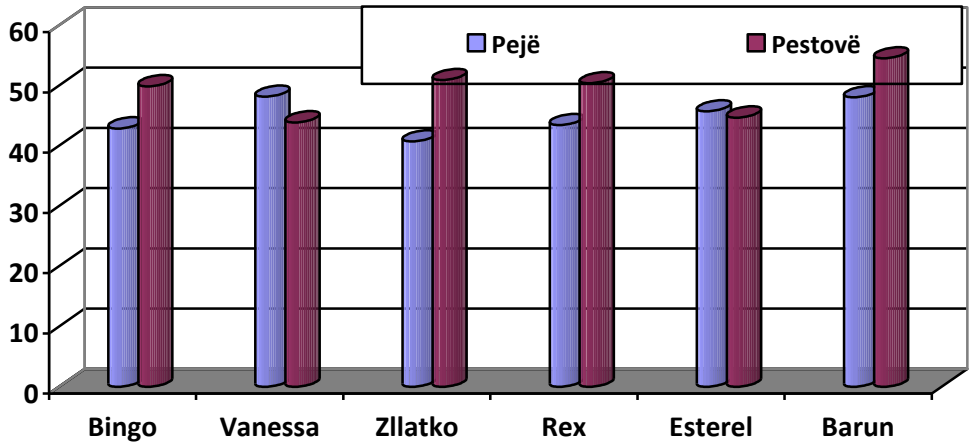
Graph 3. Yield (kg) in two areas of the 6 cultivars

In Table 6 based on the results seen that the highest yield is cultivar Zlatko 6972. Autumn barley cultivars the highest weight of 1000 seeds is found to cultivar Barun (54.55 g) and lower weight of 1000 seeds is found to cultivar Zlatko (40.733 g). While weight hectoliter with high cultivar 59,683 bingo.

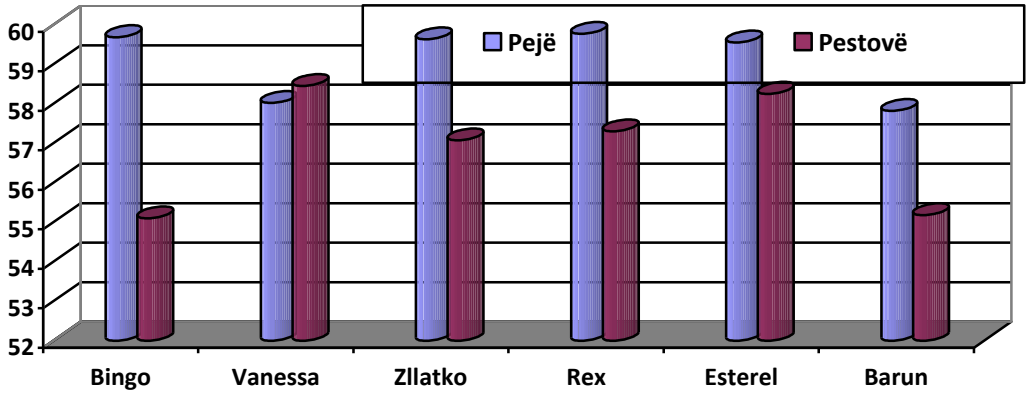
Results are taken immediately after harvest. In Table 7 are given the results of humidity % protein % grace % fat % fibers % and starch %, high protein presented cultivar Rex 13.73%.

Table 6. Weight 1000 seeds, Weight hectoliter in two areas of the 6 cultivars and classification

Cultivars	Localities	P.H%	P. A. %	First cl.%	Second cl.%	Third cl. %	No purities
Bingo	Peja	59.683	42.9	83.99	11.16	4.39	0.46
	Pestova	55.1	49.9	90.4	6.6	1.1	1.9
Vanessa	Peja	58.017	48.167	88.01	6.7	4.86	0.43
	Pestova	58.45	43.9	91.3	6.73	1.55	0.42
Zllatko	Peja	59.633	40.733	85.9	9.53	3.82	1.75
	Pestova	57.075	50.95	90.14	7.5	0.83	1.53
Rex	Peja	59.767	43.467	82.56	13	4.1	0.34
	Pestova	57.3	50.4	87.68	9.98	1.5	1.58
Esterel	Peja	59.55	45.733	86.16	9.59	3.89	0.36
	Pestova	58.25	44.7	86.64	10.8	1.8	0.76
Barun	Peja	57.817	48.067	88.31	6.64	3.82	1.23
	Pestova	55.175	54.55	91.38	6.2	0.84	1.58



Graph 4. Weight 1000 seeds in two areas of the 6 cultivars



Graph 5. Weight hectoliter in two areas of the 6 cultivars

Table 7. Presentation of the results of humidity % protein % grace % fat % fibers % and starch %

Cultivars	Localities	humidity	Protein	grace	fat	Fiber	starch
Bingo	Peja	10	13.4	1.4683	1.67	4.73	61.6
	Pestova	10.4	13.35	1.5095	1.45	4.25	60.85
Vanessa	Pejë	11.1	12.9	1.381	1.8	4.33	63.6
	Pestova	10.5	12.85	1.4855	1.7	4.15	62.15
Zllatko	Peja	10.2	13.35	1.42933	1.83	4.5	62.6
	Pestova	10.3	13.3	1.513	1.6	4.15	60.85
Rex	Peja	10	13.73	1.4683	1.67	4.73	62.5
	Pestovë	10.45	13.5	1.52	1.55	4.15	61.55
Esterel	Pejë	11.26	13.4	1.475	1.76	4.2	61.4
	Pestova	11.05	13.3	1.476	1.55	4.15	61.2
Barun	Peja	9.9	13.46	1.46967	1.76	4.1	62.9
	Pestova	10.45	13.25	1.527	1.6	4.25	62.3

Conclusions

On the basis of the results obtained in research plots of barley in the field of culture Dukagjini (Arëbnesh - Peja) and in the field of Kosovo (Pestova) can conclude the following:

- Higher yields this year we surveyed plots in Dukagjini (Arbnesh) Zlatko gave the highest yield 6972 kg / ha compared to the level of Kosovo (Pestova) 5485 kg / ha Other varieties are also shown positive results, so my high yields generally has Dukagjini plane.
- Agro-ecological conditions and manufacturing locations to explore are very suitable for the cultivation of barley, but always taking into account the application of an agro and high care.
- Agro-technical measures, in which special attention should be paid especially:
- Investigated cultivars with high potential production
- Planting performed in optimal time
- Soil analysis previously performed in terms of nutrient contents of major elements (N,P,K).
- Use adequate and balanced nutrient fertilizers according to the content of nutrient elements in the soil and planned productivity.
- Herbal turnover to be respected in order to avoid the possibility of attacks by potential wintering Harmful Biological Agents (ADB).
- Integrated Protection application to the culture of barley, but also the first culture the use of contemporary mechanism.

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